

Total Pages—4

**2nd SS—PHY (Core-III)
(Reg/Back)**

2018

PHYSICS

[Core]

Paper — III

Full Marks : 60

Time : 3 hours

**Answer all questions from Group — A and
four questions from Group — B**

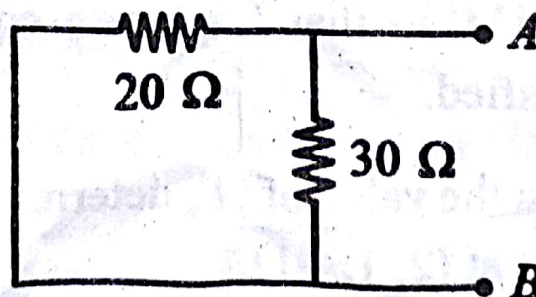
The figures in the right-hand margin indicate marks

GROUP — A

1. Answer all questions :

4 × 3

- (a) For the network shown in Fig. determine the
Norton's equivalent circuit.**



(Turn Over)

(2)

- ✓ (b) Show that electrostatic potential energy 'U' associated with a nucleus of radius 'R' and atomic number 'Z' is

$$U = \frac{3}{5} \frac{Z^2 e^2}{4\pi \epsilon_0 R}$$

- ✓ (c) Write four salient features of magnetic field of a solenoid.

GROUP – B

Answer any four questions :

- ✓ 2. (a) What are Poisson and Laplace equations for the electrostatic potential ? Derive them and explain their importance. 5 + 3

(b) If a potential $V = x^2yz + Ay^3z$

(i) Find 'A' so that Laplace's equation is satisfied.

(ii) With the value of 'A', determine electric field at (2, 1, -1). 4

3. State and explain uniqueness theorem in electrostatic. A point charge ' Q ' is placed at a point near an earthed conducting sphere. Using the method of images, obtain (a) potential (b) electric field (c) surface density of a charge on the surface due to induced charge on the sphere. 6 + 6
4. State Ampere's circuital law. Derive the differential form of Ampere's circuital law. 2 + 10
5. Write the conditions for galvanometer to be ballistic. Establish the relation $Q_s = C_s \cdot T/2\pi$ for ballistic galvanometer, where Q_s = charge sensitivity, C_s = current sensitivity of galvanometer and T is undamped period of oscillations. 2 + 10
6. Obtain general form of Gauss's law. valid in the presence of dielectric media. Derive electric displacement vector D and explain its signification. 8 + 4

7. State Faraday's law of electro-magnetic -induction. Develop the general differential form of Faraday's law viz;

$$\text{curl } \vec{E} = -\frac{\partial \vec{B}}{\partial t} + \text{curl} (\vec{V} \times \vec{B}). \quad 2 + 10$$

2018

PHYSICS

[Core]

Paper — IV

Full Marks : 60

Time : 3 hours

**Answer all questions from Group — A and
any four questions from Group — B**

The figures in the right-hand margin indicate marks

GROUP — A

1. Answer *all* questions : 4 × 3

(a) State and explain Fermat's principle of least time.

(b) Distinguish between Fresnel's class of diffraction and Fraunhofer class of diffraction.

(Turn Over)

- (c) Write the conditions for obtaining interference fringes. What happens, when two sources are not coherent.

GROUP – B

Answer any four questions

2. With the help of neat diagram, give the construction and working of Huygen's eye piece. $3 + 3 + 6$

3. What are Lissajous's figures? Discuss with necessary theory, the superposition of two rectangular simple harmonic vibrations of equal period. Also discuss the resultant vibrations for different phases. $2 + 5 + 5$

4. With necessary diagram, explain the formation of Newton's rings in reflected monochromatic light. Show that, in reflected light, diameter of dark rings are proportional to the square root of natural numbers. $3 + 9$

5. Describe Michelson interferometer. How it can be used for measuring the wavelength of monochromatic light. 12

(3)

6. With clear diagram, describe Fraunhofer diffraction at a single slit and deduce the positions of Maxima and Minima. Plot the intensity curve. 9 + 3
7. What is "zone plate". How is it constructed? Show that all zones of a zone plate have approximately equal area. Why a zone plate have multiple foci? 12
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Total Pages—4

**2nd SS—CHE (GE-II)
(Reg/Back)**

2018

CHEMISTRY

[Generic Elective]

Paper — II

Full Marks : 60

Time : 3 hours

Answer all questions

The figures in the right-hand margin indicate marks

GROUP — A

1. Answer all questions : 3 × 4

(a) State and explain Heisenberg's uncertainty principle.

(b) Why alcohol is highly soluble in water ?

(c) How carbanion is formed ?

(d) Explain Saytzeff's Rule.

(Turn Over)

GROUP – B

Answer all questions :

2. Derive Schrödinger wave equation. Write the significance of ψ and ψ^2 . 8 + 4

Or

What are Quantum Number ? Write the significance of Four Quantum Number. 2 + 10

3. Write the postulates of VSEPR Theory. Explain the shape of PCl_5 and SF_6 on the basis of VSEPR Theory. 6 + 6

Or

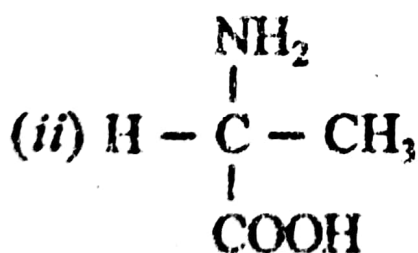
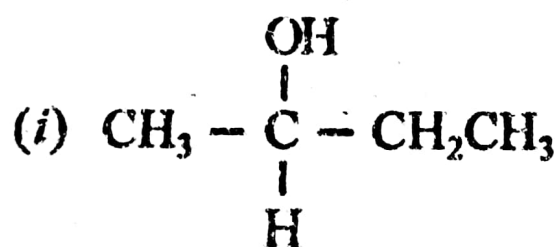
Write short notes on : 4 + 4 + 4

- (i) Born Haber cycle
- (ii) Molecular Orbital Diagram of Oxygen Molecule
- (iii) Fajan's Rule.

4. (a) Why Toulene is O-P directing ? 4
- (b) Explain the stability of carbonium ion. 4
- (c) Why chlorobenzene is less reactive than methyl chloride ? 4

Or

- (a) Geometrical Isomerism. 4
- (b) Assign *R* and *S* configuration to the following compound : 4



- (c) Conformation of cyclohexane. 4

5. (a) How ethane is prepared from (i) Methyl chloride (ii) Ethyl Magnesium bromide. 2 + 2

(4)

(b) Write the mechanism of chlorination of methane. 4

(c) Explain Markownikoff's Rule. 4

Or

(a) How acetylene is prepared from calcium carbide ? 3

(b) What is formed when propene reacts with water in presence of mineral acid. 3

(c) Explain the acidic nature of alkyne. 3

(d) How ethene reacts with ozone ? 3

Total Pages—3

**2nd SS—EVS (AECC-II)
(Reg/Back)**

2018

ENVIRONMENTAL STUDIES

[AECC]

Paper — II

Full Marks : 40

Time : 2 hours

Answer all questions

The figures in the right-hand margin indicate marks

Illustrate your answer with diagrams wherever necessary

UNIT — I

- 1. Briefly describe the air pollutants, their source of origin and effects on plants. 10**

Or

Describe how energy flows in an ecosystem. 10

UNIT – II

2. What are non-renewable resources ? Explain briefly. 10

Or

Write notes on any *two* of the following : 5×2

- (i) Algae as a fuel
- (ii) Over exploitation of water
- (iii) Management of water conflicts.

UNIT – III

3. Describe the different biodiversity conservation strategies in Odisha. 10

Or

Write notes on any *two* of the following : 5×2

- (i) Endangered species
- (ii) Poaching of wild life
- (iii) Genetic biodiversity.

UNIT – IV

4. Write briefly about environmental audit and how it helps for environmental protection ? 10

Or

Write brief notes on *all* of the following : $2\frac{1}{2} \times 4$

- (i) Environmental ethics
 - (ii) Silent valley
 - (iii) Environmental education
 - (iv) Cyclones.
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